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Sexual Violence Victimization Among Youth Presenting to an Urban Emergency Department: The Role of Violence Exposure in Predicting Risk

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Introduction

Sexual violence (SV) is a widespread public health problem among youth with significant consequences. SV includes sexual contact or acts with someone who does not consent or is unable to consent due to the effects of alcohol or drugs (Breiding et al., 2014). SV victimization increases risk for mental health problems (e.g., depression, anxiety) and physical health risks (e.g., sexually transmitted infections, injury; Choudhary, Smith, & Bossarte, 2012; Coker et al., 2002). SV victimization also increases risk of future violence, sexual risk behaviors, and substance use disorders (Jones et al., 2015). Over 25% of women and 11% of men will experience some form of unwanted sexual contact in their lifetime (Breiding et al., 2014).

Adolescence and emerging adulthood are high risk periods for SV (Institute of Medicine, 2015). Nearly 80% of female rape victims and 71% of male victims were under the age of 25 at first victimization (Black et al., 2011; Breiding et al., 2014). Most researchers focus on individual-level risk factors even though SV victimization is influenced by multiple levels of social ecology (Basile et al., 2016; Centers for Disease Control and Prevention, 2002). Risk factors for SV victimization are most often considered within the context of an intimate

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relationship (East & Hokoda, 2015). Yet, half of SV victimization occurs outside the context of a partner relationship (Black et al., 2011). Research investigating risk factors across socio-ecological levels associated with SV victimization *collectively* in both partner- and non-partner contexts, particularly among youth is lacking.

Interconnections Between Multiple Forms of Violence

Violence exposure is a potent risk factor for victimization (Hamby & Grych, 2013). Most researchers investigating the exposure-victimization relationship, however, have compartmentalized types of exposure and violence outcomes by narrowing their scope to the exposure most closely mirroring the type of victimization studied (e.g., observing physical violence in the community as a predictor of peer physical violence victimization; Hamby & Grych, 2013). Yet, understanding interconnections between different forms of violence is a central tenet of recent prevention efforts (Wilkins, Tsao, Hertz, Davis, & Klevens, 2014). Investigating the co-occurrence of multiple forms of violence exposure in relation to SV victimization likely corresponds to the reality of youth experiencing violence. Finkelhor and colleagues found that 48% of adolescents experienced more than one type of victimization and 15% experienced 6 or more types in the year before the survey (Finkelhor, Turner, Shattuck, & Hamby, 2013). Yet, few researchers have investigated associations between multiple types of violence exposure and SV victimization (Hamby & Grych, 2013; Wilkins et al., 2014). These associations may be especially relevant among adolescents living in urban, disadvantaged communities who often experience high rates of violence and who are understudied in SV research (Black et al., 2011; Foster, Brooks-Gunn, & Martin, 2007).

Developmental-Ecological Theory, Violence Exposure, and SV Risk

Developmental-ecological theory suggests that individual development is shaped by the multiple contexts in which youth interact (Bronfenbrenner & Ceci, 1994; Sallis, Owen, & Fisher, 2008). Adolescence and emerging adulthood are marked by expanding time outside the home compared to late childhood, with exposures from these contexts becoming increasingly influential (Crosby, DiClemente, & Santelli, 2009). Consequently, many risk factors increase during this developmental period, such as violence exposure in peer and community contexts (Flannery, Singer, VanDulmen, Kretschmar, & Belliston, 2007). Exposure to negative behavior of peers, including having friends who engage in delinquent and/or violent behavior, increases risk of negative outcomes such as victimization (Cobb, 2007). Exposure to community violence also increases risk of negative outcomes including other forms of violence (Zona & Milan, 2011). Despite the influence of violence exposure across multiple forms of victimization, most research focuses on physical aggression between peers. Although researchers have found that exposure to community and peer violence increases risk of physical teen dating violence (Hamby, Finkelhor, & Turner, 2012; Morris, Mrug, & Windle, 2015), few have investigated the link between peer and community violence exposure and SV victimization.

Sociodemographic Differences in SV Victimization

SV victimization risk may be higher among some subgroups of the population by race/ethnicity, sex and education level. Researchers have found higher rates of rape victimization for African-American and multiracial women compared to Caucasians and higher rates of

non-rape SV victimization among multiracial and African-American men compared to Caucasians (Breiding et al., 2014). Some researchers have also reported that women with less education may be more likely than those with more education to experience forced sex during adolescence, while others report no significant differences (Decker et al., 2014; Jones et al., 2015). Black et al. (2011) report that more women than men are victims of SV, but differences in prevalence vary by type of violence. Notably, 1.4% of men and 18% of women report lifetime rape victimization versus 22% of men and 45% of women reporting other SV.

Substance Use and SV Victimization

Alcohol and other drug use (AOD) use are associated with increased risk of multiple forms of violence, including peer-to-peer violence victimization and relationship violence (Eaton et al., 2008; Haynie et al., 2013). AOD may make youth more vulnerable to victimization through hampering cognitive and motor abilities and, consequently, reducing the capacity to recognize or avoid potential danger (Norris, Nurius, & Dimeff, 1996). Substance use may also increase risk through placing youth in a context of others engaging in high-risk behaviors (Meadows, 2001). Researchers found that substance use, primarily binge drinking, is associated with increased risk of SV victimization (Fantasia, Fontenot, Sutherland, & Lee-St John, 2015). Much of this research, however, has focused on Caucasian, college-based samples and female victims.

Current Study

We investigate the relationship between violence exposure across multiple socioecological contexts and subsequent SV victimization among youth. We include an urban emergency department (ED) based sample of adolescents and emerging adults. Urban EDs represent an important venue for studying violence among youth living in disadvantaged, largely racial/ethnic minority communities because they offer a unique opportunity to reach youth at high risk of violence who may be otherwise difficult to engage in research (Walton et al., 2009). We hypothesize that community and peer violence exposure at baseline will increase risk of SV victimization during the two-year study follow-up period, controlling for sociodemographic factors, substance use, and previous SV victimization. This study builds upon previous research because we: 1) examine associations between multiple forms of violence exposure across developmentally relevant socioecological contexts and SV victimization risk; 2) investigate forms of violence exposure and victimization that peak during adolescence and emerging adulthood; and 3) examine these relationships in an understudied high violence-risk population.

Method

Sample

Data were collected as part of a larger prospective study of violence and substance use among youth seeking treatment at an urban emergency department (ED) with a level 1 trauma designation (Bohnert et al., 2015; Cunningham et al., 2014). In the parent study we recruited 14 to 24 year old patients presenting to the ED for assault-related injury (N = 349) and a comparison group (N = 250) presenting for any other reason (December 2009 to

September 2011). The assault-related injury group was stratified by gender and age. The comparison sample, which was recruited in an alternating pattern with the assault-related injury group, was proportionally balanced based on sex and age range (14–17, 18–20, and 21–24 years). Based on the aims of the larger study, eligibility criteria for both groups included report of any drug use within the past 6 months on a screening survey (see measures; Bohnert et al., 2015; Cunningham et al., 2015). Patients presenting with a chief complaint of acute sexual assault or child maltreatment, patients with impaired cognitive functioning that would preclude informed consent, or patients who were minors without parents/guardian were not eligible for the study. Study procedures were approved by the Institutional Review Boards at the Hurley Medical Center in Flint and the University of Michigan; a National Institutes of Health Certificate of Confidentiality was obtained.

After providing consent or assent, patients self-administered a computerized screening survey for study eligibility and possible enrollment. Follow-up assessments were conducted at 6, 12, 18 and 24 months post baseline in the study ED or a community location. Participants received $20 remuneration for the baseline survey, $35 at 6 months, $40 each at 12 and 18 months and $50 for the 24-month follow-up.

Measures

Sociodemographic characteristics—Sociodemographic characteristics included age, sex, race/ethnicity and highest level of parent education. Sex was coded 0/1 (male/female). The original questionnaire included multiple self-identified racial/ethnic categories: African-American, Caucasian, Multi-Racial and other. We dichotomized race/ethnicity as African-American/not as this was the largest racial/ethnic group in the sample (58%) and an understudied population in the SV victimization literature. We measured public assistance status (yes/no) and highest parent education (1=some high school to 6=post graduate work).

We found no group differences between the assault-injured and comparison groups by age, sex, receipt of public assistance, and parent education.

Substance Use—We measured past 6 month problem drinking at baseline using the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C) (Chung, Colby, Barnett, & Monti, 2002; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). Participants were at risk (dichotomized yes/no) for alcohol misuse if those aged 14–17 scored 3 or higher on the AUDIT-C summary score and those 18 and over scored 4 or higher (Dawson, Grant, Stinson, & Zhou, 2005). We measured past 6 month other drug risk using the National Institute on Drug Abuse Modified Alcohol, Smoking and Substance Involvement Screening Test (NIDA-ASSIST) (Humeniuk et al., 2008). Participants were considered at risk for drug misuse (dichotomized yes/no) if they scored 4 or higher on the ASSIST summary score for marijuana or illegal drug use (Cunningham et al., 2014).

Violence Exposure—We measured three forms of violence exposure: SV victimization, peer violence and community violence. We assessed SV victimization using an item from the Youth Risk Behavior Survey (Centers for Disease Control and Prevention (CDC), 2017) asking if participants had been physically forced to have sexual intercourse and an item from Parks et al. (2008), asking if someone had sexual intercourse with them when they were

unaware or unable to give consent. Participants were asked at each follow-up assessment about SV victimization within the past 6 months. Our primary dependent measure, SV victimization during follow-up was coded 1 if respondents reported yes on any follow-up survey. We dichotomized the variable because most participants (85%) who reported SV during follow-up reported one instance. After the follow-up period, we also used medical chart review to identify additional reports of participant SV victimization during the 2-year follow-up period and coded these as a "1" on the dependent variable. Chart reviews were audited regularly to maintain reliability using established criteria by trained research assistants (Gilbert, Lowenstein, Koziol-McLain, Barta, & Steiner, 1996). Baseline SV victimization was evaluated using the same items, but asked about lifetime victimization.

We assessed peer violence exposure using the sum of two items from the Denver Youth Survey (Institute of Behavioral Science, 1987) asking the number of each participant's friends who got into fights and carried a weapon (1=None to 5=All). We assessed community violence exposure using the sum of 5 items from the Things I Have Seen and Heard Scale (Thompson et al., 2007), asking how often in the past 6 months (0=Never to 3=Many Times) participants reported hearing gunshots, seeing drug deals, home invasion, witnessing someone get shot or stabbed and seeing gang activity. We dichotomized the variable such that participants in the lowest 25th percentile were coded as zero which represented 4 or fewer instances of community violence exposure, and those who reported 5 or more instances were coded as 1. Violence is pervasive among youth living in this community, and the operationalization of violence exposure as the highest 75th percentile is indicative of this reality.

Data Analytic Approach

We investigated the relationship between baseline predictors and SV during follow-up using logistic regression (Stata 14.1, StataCorp). We adopted a model building strategy as described by Hosmer and Lemeshow (2013). First, we investigated univariate statistics on all variables of interest and contingency tables of each variable with our outcome of interest (SV at follow-up). We chose variables based on theory and previous empirical research, and statistical and substantive contributions to the overall model. Following fit of the multivariate model, we examined the Wald statistic for each variable in the model for its relative contribution to overall fit. Next, we investigated possible interaction effects among predictors.

We used the Hosmer-Lemeshow goodness-of-fit statistics, classification accuracy using the area under the ROC (Receiver Operating Characteristic) curve and specification error, evaluating fit for logit as the link function and inclusion of relevant predictors to test model fit (Hosmer et al., 2013). We checked for multicollinearity to ensure validity of coefficient estimates. We also explored residuals using an index plot of standardized Pearson residuals. We used multiple imputation (MI) to handle missing data on independent variables (Schenker et al., 2006). For our outcome variable, we examined participants who had missing data versus non-missing on all sociodemographic variables to examine possible differences.

Results

Descriptive Statistics

Descriptive statistics at baseline are provided in Table 1. Fifty-nine percent of participants were male, and 58% African-American. The average level of parental education was equivalent to a high school diploma/GED- some college. A notable proportion of youth reported substance use and violence, with 87% reporting other drug use, 22% reporting lifetime SV and 78% reporting high community violence exposure. We found no differences in SV victimization at baseline by age, parent education, peer violence exposure, alcohol risk or drug risk (results not shown). We did find differences in SV victimization risk at baseline by community violence exposure (X^2=4.06, p=.04), and race/ethnicity (X^2=5.12, p=.02), with those in the high community violence exposure group and non-African-Americans more likely to report baseline SV victimization. Twelve percent of participants reported any SV victimization during the follow-up period. Previous SV victimization, high violence exposure and peer violence exposure were associated with SV victimization during follow-up. SV during follow-up did not differ by sociodemographic characteristics.

Logistic Regression Models

We included previous SV victimization and sociodemographics as predictors in Model 1, added AOD in Model 2, and added peer and community violence in Model 3 (see Table 2). Our model fit statistics for our final model (Model 3) were as follows: Hosmer-Lemeshow gof: Pearson X^2: 460.17, p=0.60. Area under the ROC curve: 0.74, which is considered acceptable discrimination between those who experience the outcome and those who do not (Hosmer et al., 2013). The index plot of standardized Pearson residuals suggested acceptable residuals (plot not shown). Results from the link test indicate that the logit link function is suitable to model the outcome as a linear combination of model predictors (z-statistic for linear predicted value: 2.47, p=0.01) and the model is properly specified; that is, necessary predictors are included (z-statistic for linear predicted value squared: 0.49, p=0.62 (UCLA: Statistical Consulting Group, 2016).

Model 3 indicated that SV victimization (lifetime) at baseline, race/ethnicity, high community violence exposure and peer violence perpetration were significant predictors of SV victimization during follow-up. The odds of SV victimization during follow-up for those with previous SV victimization was 2.7 times higher than those without previous SV victimization. SV victimization at follow-up was 1.88 times more likely for African-Americans versus Caucasians and mixed race/other participants. The odds of SV victimization during follow-up was three times higher for youth in the high community violence exposure group compared to those in the low community violence exposure group. For every one unit increase in peer violence perpetration, the odds of SV victimization at follow-up increased by 58%. Sex, age, parent education, alcohol risk, and other drug risk were not associated with likelihood of SV during follow-up. To explore the violence exposure variables further, we examined predicted probabilities of SV during follow-up by community violence and peer violence perpetration holding other variables at constant values (see Figure 1 and 2 for details). The probability of SV victimization increased from . 14 to .33 for low versus high community violence exposure (Figure 1). Increasing levels of

peer violence perpetration is associated with increasing probability of SV during follow-up (see Figure 2).

Missing Data

We investigated if participants with missing data on the outcome variable (n=88) were different than those retained in the sample. We found no differences by SV victimization at baseline, parent education or age. More males were lost to follow-up than females (X^2=9.62, p<.05), and Caucasian and mixed race/other compared to African-American participants (X^2=5.68, p<.05).

Discussion

Sexual violence (SV) is a concerning public health problem among adolescents and emerging adults as it peaks during this time of life (Institute of Medicine, 2015). A disproportionate number of youth experience multiple forms of violence (Finkelhor et al., 2013). Consequently, understanding interconnections between different forms of violence across socioecological levels is necessary to inform prevention strategies (Wilkins et al., 2014). Our results indicate that peer and community violence exposure are associated with increased odds of SV victimization after accounting for previous SV victimization. Thus, effective prevention strategies may benefit from attention to multiple forms of exposure across contexts. Our findings suggest that peer context is a key contributor in the transmission of violence exposure to risk of SV victimization. This may be because aggressive/antisocial peers expand contact with others who engage in violent behaviors, which may elevate SV victimization risk (East & Hokoda, 2015).

Our results also indicate that youth exposed to high levels of community violence are more likely to experience SV victimization than those with less exposure. Communities with high levels of violence are also likely to experience social disorder that can result in inadequate formal and informal controls to regulate antisocial behavior (Sampson & Groves, 1989). Researchers investigating community level risk factors have focused on peer violence, but our study expands this approach to include the relationship between community level exposure on SV victimization risk.

We did not find a relationship between substance misuse and subsequent SV victimization. This finding is consistent with the findings reported by Elwood et. al. (2011), but both our studies included a high proportion of respondents reporting other drug misuse. One explanation for this finding may be due to limited variation in the substance misuse variable and in our study whose eligibility criterion included at least some substance use. Furthermore, researchers have found that the relationship between substance use and violence varies by drug examined (Stoddard et al., 2015). A more precise approach to assessing the link between violence and substance use may include assessing daily associations between alcohol and specific other drugs and SV using daily process assessments or retrospective daily timeline calendar approaches (Epstein-Ngo et al., 2013). Additional research incorporating daily assessment may provide needed detail to understand the relationship between substance use and SV victimization.

We found no gender differences in SV victimization. One explanation may be that male victimization is underreported, in part because it is contrary to the dominant paradigm of male perpetrators and female victims (Denov, 2003; Stemple & Meyer, 2014). Our results are consistent with Stemple and Meyer (2014) who found widespread victimization among men *and* women with some forms of victimization among men roughly equal to that of women, particularly among racial/ethnic minorities. Our results underscore the need to address SV victimization among both men and women, especially among African-American youth in urban socioeconomically disadvantaged communities.

Our finding that African-American participants were more likely to experience SV victimization during follow-up is consistent with previous research. Disproportionate burden of victimization among African-Americans in this study may be due to the intersection of multiple factors related to health disparities including elevated poverty, limited social controls, and discrimination among youth living in an urban, disadvantaged community (Breiding et al., 2014). These results highlight the importance of prevention efforts focused on populations disproportionately experiencing SV.

We did not find a relationship between age and SV victimization risk. This may be because the current study spans the developmental period at highest risk for SV. Investigating the relationship between sexual violence victimization and violence exposure stratified across multiple developmental stages (e.g., early-, middle- and late-adolescence) would be a useful direction for future research. We also did not find a relationship between parent education and SV. This finding may be because families living in urban disadvantaged contexts experience similar challenges to accessing educational and employment opportunities.

Implications for Practice

Our findings support the notion that violence prevention requires attention at multiple levels of influence including peer and community violence (Low & Espelage, 2014)(Thornton, Craft, Dahlberg, Lynch, & Baer, 2002). The effects of more broad violence prevention programs on SV, however, have not been adequately studied. Our results support Hamby and Grych's (2013) and Wilkins et al's (2014) recommendations for advancing prevention based on interconnections between multiple forms of violence. The Green Dot program, for example, is an intervention focused on reducing sexual violence perpetration, but researchers also found that the intervention reduced other related forms of interpersonal violence (Coker et al., 2017).

Our results also confirm the need to address violence risk across socioecological levels, especially peer and community level influences (Wilkins et al., 2014). Our results suggest an intervention focused primarily on individual and interpersonal skills building may benefit by incorporating a component for community capacity building as well. Integrating comprehensive, multi-level evidence-based prevention strategies that incorporate community and peer components as well as SV specific content, may help reduce both SV and violence victimization more generally among youth living in urban, disadvantaged communities.

Limitations

The definition of SV, according to the Centers for Disease Control and Prevention, includes completed and *attempted* non-consensual sexual acts. Because our measure only included completed acts, our results may under-estimate SV victimization. This underestimation suggests that our findings may be somewhat conservative. Our sample also excluded participants who presented to the ED for acute sexual assault at the baseline visit. This may also contribute to under-estimation of the true relationships between SV victimization and multiple forms of violence exposure which further suggests that the associations we found are quite robust. We also did not include family violence in our models. Although researchers have found a relationship between family violence exposure and dating violence victimization, the relationship is between *early* exposure to family violence and *later* victimization (Olsen, Parra, & Bennett, 2010). Yet, during adolescence, spheres of expanding social influence, such as among peers and within the community (Crosby et al., 2009), may be especially relevant risk factors for SV. Our study was conducted in one inner-city location, and more research is needed investigating SV victimization among youth living in other urban, disadvantaged communities. Thus, our results may not generalize to other similar urban settings across the U.S. Nevertheless, this is a vital population to study as they may be at high risk for violence exposure and subsequent consequences including SV victimization (Kennedy, Bybee, Sullivan, & Greeson, 2010). These limitations notwithstanding, our study contributes to our understanding of risk factors for SV especially salient to an understudied population in the SV victimization literature.

Conclusions

SV is a widespread, challenging problem among adolescents and emerging adults. One of the most potent risk factors for victimization across types of violence is violence exposure, but violence exposure and SV victimization is understudied among those at highest risk of violence more generally (Hamby & Grych, 2013). Although understanding interconnections between different forms of violence is critical to identifying cross-cutting approaches to prevention (Wilkins et al., 2014), few researchers have investigated the link between violence exposure in developmentally relevant contexts such as peers and community and SV risk. Our study contributes to this literature by including peer and community violence exposure as predictors of SV victimization. Our results also support the notion that integrating a comprehensive, multi-level, evidence-based prevention approach that incorporates strategies at community and peer levels, as well as SV specific content, may help reduce SV victimization among youth living in urban, disadvantaged communities.

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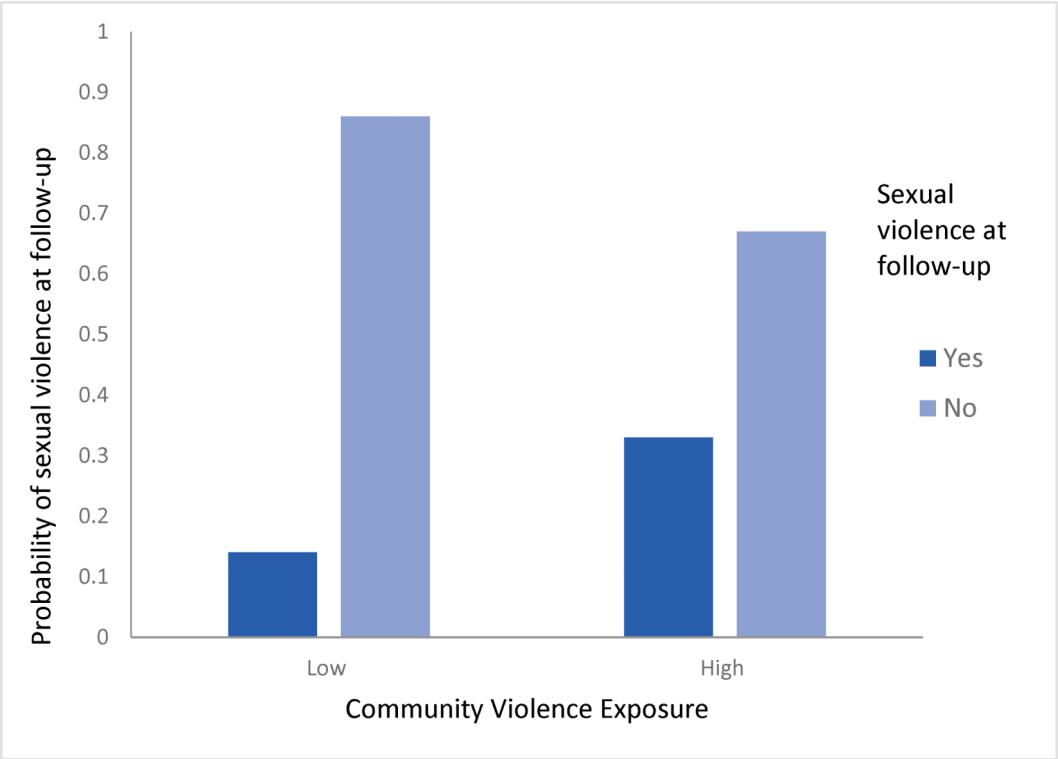

Figure 1.
Predicted probability of SV victimization at follow-up by community violence exposure. Other model variables held at the following values: female, SV victimization at baseline, no alcohol or drug risk, African-American, mean parent education, mean peer violence.

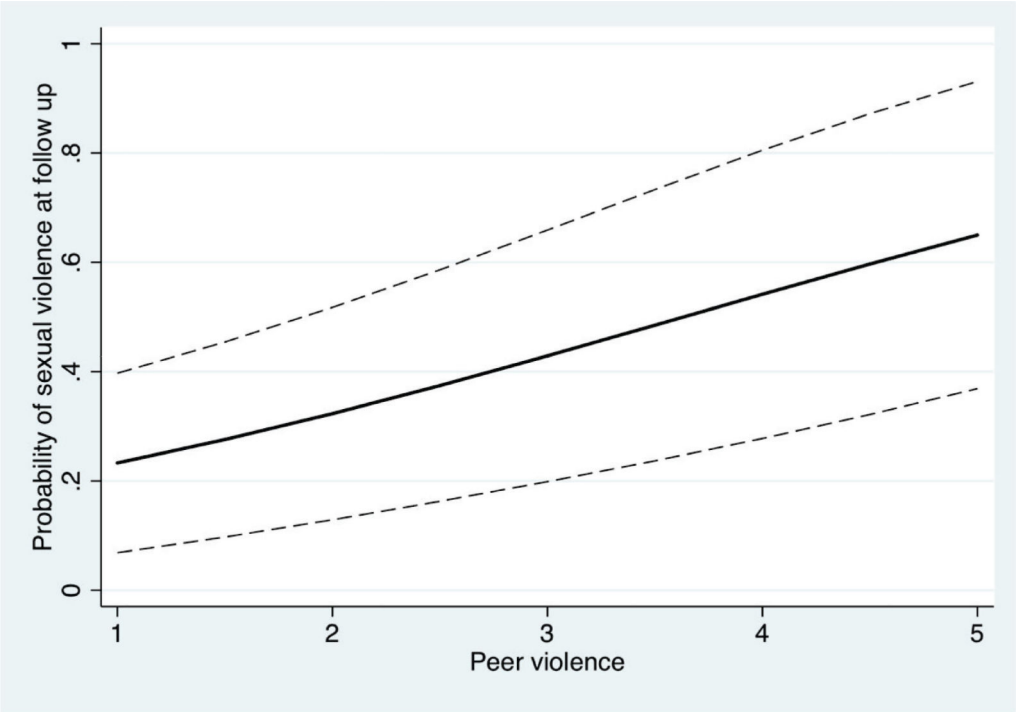

Figure 2.

Predicted probability of SV victimization at follow-up by peer violence exposure. --- represents the 95% CI for the predicted probability. Other model variables held at the following values: female, SV victimization at baseline, no alcohol or drug risk, African-American, mean parent education, high community violence exposure.

Table 1

Descriptive statistics for study variables

	Total (Baseline) n=599	SV at follow-up[a] n=63	No SV at follow-up n=449
Sociodemographics			
Age *mean, SD*	20.05 (2.42)	20.04 (2.20)	19.98 (2.43)
Sex *n, %*			
Male	353 (58.8)	36 (57.1)	252 (56.1) *
Race/ethnicity *n, %*			
African-American	349 (58.2)	44 (69.8)	264 (58.8)
Parent education *mean, SD*	2.58 (1.05)	2.38 (.96)	2.62 (1.05)
Substance use			
Alcohol risk (Yes) *n, %*	188 (31.3)	23 (36.5)	127 (28.3)
Other drugs risk (Yes) *n, %*	522 (87)	54 (85.7)	392 (87.3)
Violence			
Previous SV victimization *n, %*	133 (22.2)	26 (41.3)	87 (19.4) **
High community violence exposure *n, %*	468 (78.0)	59 (93.6)	340 (75.7) *
Peer violence exposure *mean, SD*	2.10 (0.96)	2.57 (1.12)	2.00 (.90) **

[a] Reporting SV on any follow-up survey at 6,12,18 and 24 months post baseline

* p<.05

** p<.001 comparing groups by SV status at follow-up

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Table 2

Summary of logistic regression models predicting odds of SV victimization during the two-year study follow-up period

	OR (95% CI)		
	Model 1	**Model 2**	**Model 3**
Intercept	0.10(0.01–1.21)	0.14(0.01–1.81)	0.06(0.00–0.93) *
Previous SV victimization	3.46(1.89–6.32) **	3.43(1.87–6.28) **	2.71(1.45–5.09) *
Male	1.43(0.81–2.54)	1.41(0.79–2.52)	1.23(0.68–2.27)
Age	0.99(0.88–1.11)	0.98(0.87–1.10)	1.01(0.89–1.14)
African-American	1.88(1.04–3.40) *	2.07(1.13–3.80) *	1.88(1.01–3.50) *
Parent education	0.82(0.62–1.07)	0.80(0.61–1.05)	0.78(0.59–1.03)
Alcohol risk		1.62(0.90–2.92)	1.29(0.70–2.37)
Other drug risk		0.75(0.34–1.67)	0.57(0.25–1.31)
Peer violence exposure			1.58(1.19–2.08) **
High community violence exposure			2.96(1.01–8.68) *

* $p<0.05$

** $p<0.001$